Biological Evaluation of a Fir Looper (Nepytia freemani) on White Fir in Timpanogos Cave Monument and Uinta National Forest, 1966

The following is an evaluation of a looper (Nepytia freemani) outbreak on white fir (Abies concolor) in portions of Timpanogos Cave National Monument and Uinta National Forest. Material for this report was complied from special evaluation surveys, from laboratory rearings, and by first hand observations of the infestation itself.

Briefly, heavy looper populations defoliated white fir and associated species in portions of the Monument and Forest. Douglas fir and Engelmann spruce were also defoliated but white fir suffered the heaviest damage. Many of the defoliated trees were weakened to such an extent that they succumbed to attacks by the fir engraver beetle, Scolytus ventralis. Special egg surveys showed the looper population to be on the decline, hence, only negligible to light feeding activity will occur in 1967. No control will be needed. Details of the evaluation follow.

This is the second consecutive year of white fir defoliation by this insect, Nepytia freemani, on the Uinta National Forest and in Timpanogos Cave National Monument. In 1965 the infestation was contained in American Fork Canyon in portions of both the National Monument and Forest. This year the aerial detection survey reported a second infestation in Dry Creek Canyon on the Forest, about 6 miles north of the main outbreak in American Fork Canyon. This finding was confirmed later during a follow-up ground examination. More than 800 acres were defoliated by this looper, 700 acres in American Fork Canyon and 100 acres in Dry Creek Canyon. Of the American Fork infestation approximately half is in the National Monument and half in the National Forest.

The American Fork infestation extends from Burned Canyon west along the canyon bottom and slope, south to the Forest boundary. In Dry Creek Canyon defoliation occurred in the canyon bottom and part way up the south slope in a 1½ mile long strip of white fir beginning ½ mile east of the Forest boundary.

Although heavy defoliation occurred last year, Regional entomologists were unable to provide a meaningful evaluation because of inexperience with this insect. Larval parasitism was high but there were many surviving moths and egg deposition appeared relatively heavy. It appeared certain there would be defoliation this year but there was no precedent or comparative data to use in predicting the amount and extent of damage, much less the trend.

Larval populations were exceptionally heavy this year. Heaviest defoliation occurred in Timpanogos National Monument in the vicinity of the administration area. Intensity of damage varied throughout both infestations and ranged from complete defoliation of understory trees, and complete stripping of upper crowns of dominant and codominant trees to negligible feeding. White fir, Abies concolor, is the favored host and suffered the

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worst damage. In some heavily defoliated white firs the larvae resorted to eating the tender bark of the new shoots after the needles were stripped. Douglas-fir and Engelman spruce were also defoliated. Understory herbacious plants were defoliated wherever larvae populations were heavy.

Whether most of the severely defoliated white firs suffered permanent damage is unknown at this time. No doubt some damage occurred, mostly in the form of top kill, but the full impact of the heavy feeding will not be known until next spring. Examination of the defoliated shoots showed formation of many green adventitious and terminal buds. A respite from looper activity will allow many of these trees to recover.

Periodic visits were made to the infestation this summer and fall to collect information on the biology and habits of the looper. Superintendent Walker and other management personnel helped in this endeavor by making timely larval collections. With this assistance it was possible to gain valuable information on oviposition habits and potention; feeding activity; larval, pupal, and egg parasitesm; the number and frequency of development stages (instars); and sampling.

A comprehensive egg survey was conducted this fall to determine the preferred oviposition site on white fir using both absolute units (branches) and relative density (unit area) as possible sampling units; and to provide an estimate of next years population level as well as distribution. The first part was accomplished by felling five codominant white firs in Dry Creek Canyon, dividing the tree crowns into thirds, and removing two whole branches from the midjoint of each crown level. The branches were measured as to length and width, cut up, and placed in individual cloth bags for later examination. The second phase was undertaken in American Fork Canyon. There, four 15 inch branches were cut by pole pruners from the mid-crown of 10 randomly selected codominant white firs throughout the infestation. The results of this survey have not been fully evaluated, but sufficient information is available at this time to provide a fairly accurate prediction of 1967 conditions.

From the data collected it appears that Nepytia freemani populations have collapsed in all infested areas in Timpanogos Cave National Monument and on the Uinta National Forest. The number of newly laid eggs found was considerably under last year. Considering the scarcity of eggs and other factors such as predation, parasitism, winter mortality, normal loss of eggs and small larvae, the looper population in 1967 will be very low. The reasons for this sudden and significant population decline are not fully understood, but factors like starvation, dispersal, disease and parasitism are all suspect of playing significant roles in reducing the numbers. Also, larval parasitism by an undetermined ichneumon wasp was exceptionally high this year and last.

Associated with fir looper damage was the fir engraver beetle, Scolytus ventralis. Successful beetle attacks were found in white fir trees weakened by looper defoliation. Park service personnel felled and burned 64

engraver beetle infested trees. Although the trees contained broods, all of which were destroyed, there were beetles from other sources in flight and making new attacks on October 5. A short search for recent engraver beetle activity was made in the National Forest below the Monument, but none was found.

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